**Report on the outcomes of a Short-Term Scientific Mission1**

Action number: CA18221

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| **Details of the STSM**  Title: Analysis of spatial data on European herpetofauna  Start and end date: 31/08/2023 - 14/10/2023 |
| **Description of the work carried out during the STSM**  Starting from NA2RE project, the goal of the STSM project was twofold: (i) to update the distribution data and taxonomy information of amphibian and reptile species within the NA2RE project and (ii) to develop a customized web-based Shiny application for utilizing the NA2RE system. Two previous STSM projects, led by Simeon Lukanov and Eirini Trypidaki, had similar objectives. In this project, I built upon their work. To gather additional occurrence data that might not have been available in online repositories, we established a database containing information about herpetologist societies and experts. This database included details such as national society names, websites, contact persons, and email addresses. We reached out to a total of 72 individuals and organizations through e-mail or online forums to collect extra data. As a result, we received nine databases from three different organizations and six different researchers. I performed a data cleaning procedure on the received databases, which involved two primary steps. First, I removed records that met the following criteria: (i) lacked coordinates, (ii) had low coordinate precision (i.e. below 100 km, as this represents the grain size of our analysis), and (iii) had suspicious high individual counts (indicating inappropriate data or data entry problems). In the second step, I checked for geographical outliers such as sea coordinates for terrestrial species, zero coordinates, coordinate - country mismatches, coordinates assigned to country centroids, and coordinates assigned to biodiversity institutions, as well as temporal outliers (i.e., old records), and taxonomic problems (e.g., spelling mistakes in the species names or synonyms). I standardised the databases by retaining only essential information, which included species names, coordinates, the year in which the species presence was recorded, and the data source. All GPS coordinates were converted to decimal degrees. For gridded data (10km x 10km or 50km x 50km), I calculated the centroids using the terra R package. Furthermore, I included additional information regarding erroneous records and whether a species was introduced. I assigned "yes" or "no" categories to records based on expert knowledge, indicating whether a particular species could feasibly be found at the specified location. Similar "yes" and "no" categories were applied to species classified as introduced. The term introduced refers to non-native species, following the definition by Speybroeck et al. (2020), as well as species native to certain parts of Europe but introduced to other regions. Given that the ShinyApp for visualizing amphibian and reptile species distribution online had already been developed and improved in previous projects, I used remaining time on preparing a draft manuscript. |
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| **Description of the STSM main achievements and planned follow-up activities**    The STSM project successfully accomplished its objectives. Following the data cleaning process of the received databases, I incorporated a total of 531461 records representing 166 species (56 amphibian and 110 reptile species) from six different countries, i.e., Romania (38890 records), France (247592 records), Austria (21984 records), Albania (1181 records), United Kingdom (185657 records) and Hungary (36304 records) into the existing database. I documented an additional 7 new species. Notably, these newly identified species are introduced.  A first draft of the manuscript has been uploaded to Google Drive, and coauthors have begun providing comments and feedback.  The outcomes of the STMS project have a significant contribution to WG2, specifically in Task 2.1, which focuses on ecosystem-level assessment, particularly in agricultural areas as habitats for herpetofauna. The updated distribution and biogeography data of amphibians and reptiles in Europe serve as a valuable resource for documenting the occurrence of herpetofauna in agricultural landscapes across Europe. Additionally, this data aids in understanding species-specific and species richness patterns in response to various features within agricultural landscapes.  The outcomes also make a meaningful contribution to WG2, Task 2.3, which involves the characterization of aquatic scenarios of pesticide exposure. The project provides substantial data to document which amphibian and reptile species are exposed to pesticides in habitats adjacent to agricultural landscapes.  Furthermore, STSM has effectively expanded and reinforced collaborations between Portugal, Romania, and other partner countries within the COST network. It has also opened exciting future research opportunities and potential partnerships. |